CASE REPORTS

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Avulsion of Ischial Apophysis

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INJURIES TO THE ISCHIAL apophysis are uncommon but are associated with recognized clinical and x-ray features. The present report is prompted by referral to our x-ray department of three patients, two of whom had a provisional diagnosis of "bone tumor" made elsewhere.

Apophyseal injuries are also identified by numerous terms such as avulsion of the apophysis, epiphyseolysis, avulsion fractures, epiphysitis secondary to trauma or osteochondritis. Apophyseal avulsion is descriptive and we consider it the proper term. A fragment of ischium may be avulsed along with the secondary center, but the diagnosis and treatment are identical in both instances.

The secondary center for the ischium ossifies in the mid-teens and unites at 19 to 21 years of age. When the center is first ossified and visible on the films it is either a thin linear crescentic shadow or consists of several separate calcified centers which later coalesce. The apophyses on the two sides may be asymmetrical in appearance and date of ossification. In the seven-year interval between 14 and 21 the center is vulnerable to avulsion. The adductor magnus, the long head of the biceps femoris, the semimembranosus and the semitendinosus attach to the tuberosity. The injury responsible for the avulsion is one that causes a sudden tension or pull on the hamstring muscle or adductor magnus. This occurs when the leg is forcibly abducted and the thigh flexed. In teenagers this injury frequently occurs during strenuous sports such as basketball, highjumping, running or hurdling. At the time of injury there is usually sharp, severe pain aggravated by stretching the thigh, with muscle spasm and weakness. Limping is commonly present. The ischial area may be swollen and tender. In most reported cases there is immediate disability and limitation of activity, but an occasional patient will not recall a specific disabling injury or will have only slight discomfort. All pain and tenderness may clear completely, but often there are chronic or intermittent symptoms. One of our patients with an old injury had pain only on sitting, a feature that has been noted in other cases.[1] Weight-bearing or stooping may aggravate the pain. The sciatic nerve may be irritated, especially when there is nonunion and bony overgrowth.[2]

Films immediately following injury may show partial or complete apophyseal avulsion, or avulsion of this center plus a fragment of ischium. When there has been an old injury with an ununited fragment, x-ray films show bony overgrowth not only on the ischium but also on the margins of the avulsed fragment, resulting in a large, irregular, bony mass which may be fused to the ischium or remain as a separate bony mass or have fibrous union. Soft tissue calcification often occurs in the adjacent tissues. We have seen three additional patients with asymptomatic overgrowth of the ischium noted as an incidental finding. After an injury when the secondary center has not yet ossified, there may only be a little irregularity of the inferior margin of the ischial tuberosity, mottling and loss of sharp definition of the cortex.

Treatment in acute cases is symptomatic, with bed rest advised for about two weeks and then

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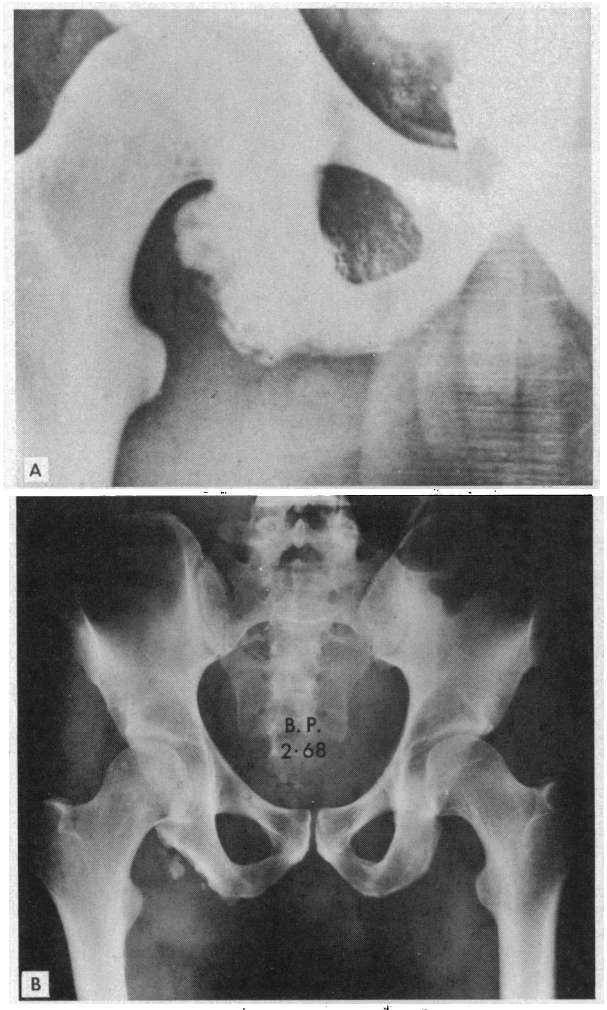


Figure 1 (Case 1).—A—Bony proliferation on the lateral inferior aspect of the right ischium, measuring 1.5 and 5.5 cm. B—Nineteen years after surgical removal of an avulsed ischial apophysis.

ambulation with crutches and limited activity for about six weeks; strenuous activity should follow bony union. Heat often relieves the discomfort. In late cases, treatment depends on the extent of clinical symptoms and disability. Some patients have few complaints, even with a large mass of bone, and need only occasional rest periods and heat for prolonged relief. Others may have sufficient disability, with pain and pressure symptoms, to warrant removal of the bony mass and re-attachment of the tendons. It may prove difficult to remove the mass without recurrence and reossification in the adjacent soft tissues (Case 2).

The following three cases are included to demonstrate the roentgen changes and problems in management.

Reports of Cases

Case 1. The patient was a 16-year-old boy when admitted to hospital in June 1949 because his family physician had diagnosed a bone tumor on physical examination when a large bony mass was palpable in the buttock. Six months earlier, he had fallen in a sitting position. After initial slight pain there was no further discomfort. Films show (Figure 1A) bony proliferation on the lateral inferior aspect of the right ischium measuring 1.5 cm by 5.5 cm. There is a mottled pattern and a moderate degree of irregularity of outline, part of which may be a result of calcification of the adjacent epiphyseal plate. The large bony mass was resected and the muscles reattached to the ischium. Sections showed: "Fragments of dense bone of a cancellous type and overproduction of hyaline cartilage and fibrous connective tissue. Calcification was present in all sections."

The patient was last seen in February 1968, 19 years after operation. He was free of pain and entirely asymptomatic. There was no limitation of his activity. X-ray films (Figure 1B) showed: "Asymmetry of the ischia; the right ischium has a sclerotic, 'scalloped' inferior margin. There are several small smooth ossific densities in the adjacent soft tissues."

Case 2. A 15-year-old boy was admitted to hospital in May 1961 because his family physician suspected bone tumor. A year before, patient had slipped while playing basketball and suddenly flexed his right hip in abduction. There was immediate pain and discomfort but no real impairment of his usual activities. He had mild discomfort when sitting. X-ray films at that time, February 1960 (Figure 2A) showed: "Avulsion of the apophysis and a portion of the adjacent margin of the right ischium with distal shift of this fragment of about 3 cm." The patient received no treatment then.

On examination at the time of admission, a hard fixed mass was felt in the posteromedial aspect of the right thigh, extending inferiorly from the ischial tuberosity about 6 cm. The gait was normal and there was no tenderness. The legs were of equal length and there was no muscle atrophy. Bilateral tightness of hamstrings was noted but the range of motion of the right hip was normal. X-ray films (Figure 2B) showed: "Extensive new-bone formation around the

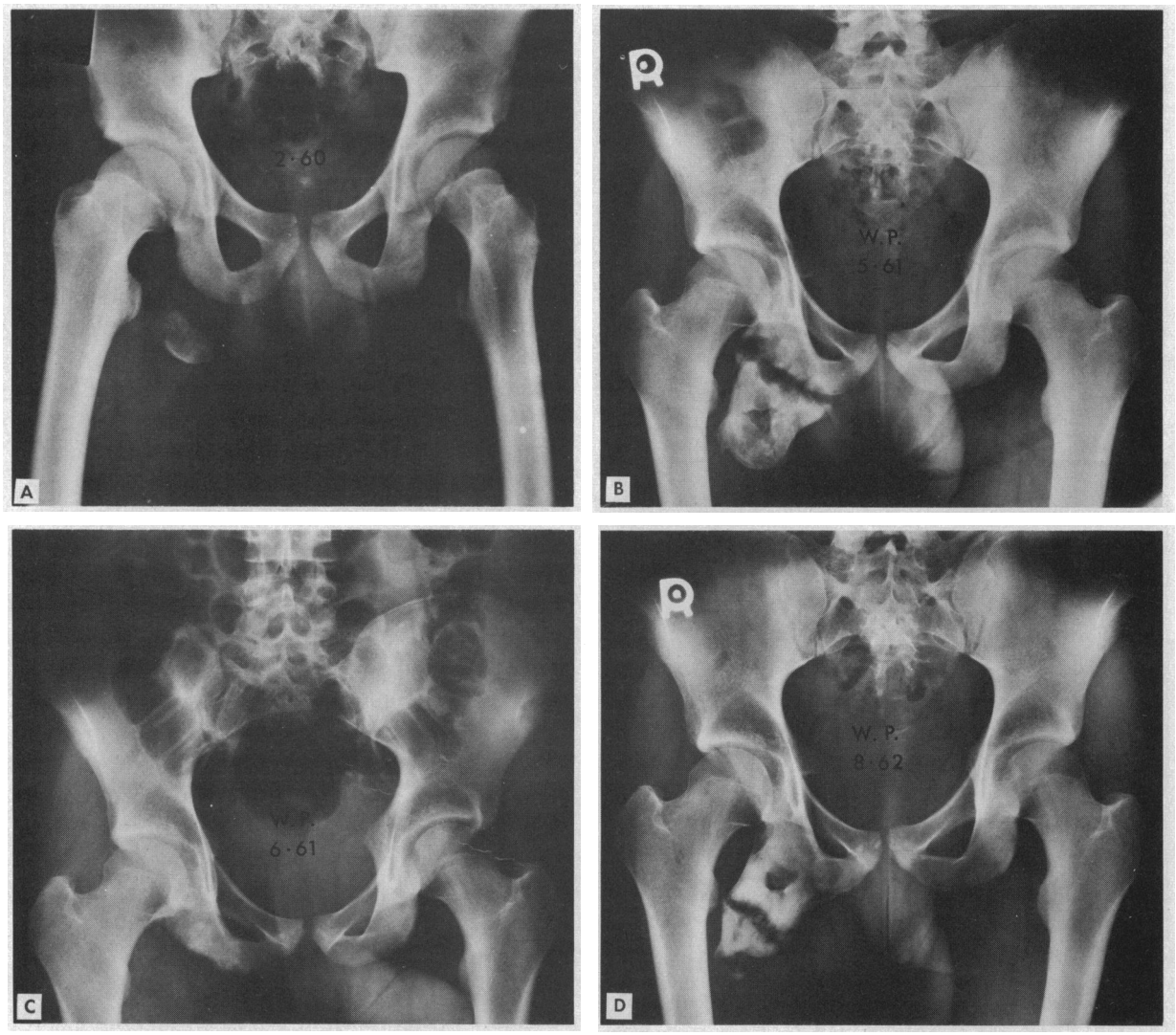


Figure 2 (Case 2).—A—Immediately after injury, showing avulsion of the apophysis and a portion of the adjacent margin of the right ischium with inferior shift of this fragment of about 3 cm. B—Fifteen months later extensive bony overgrowth is shown around the avulsed ischial apophysis with irregular ossification centrally. The patient was relatively asymptomatic. C—Film taken after operation shows residual faint calcification in the soft tissues. D—Film taken 14 months after operation shows regrowth and reossification of the bony mass. The patient, however, was asymptomatic.

avulsed ischial apophysis. There is an irregular ossified bony mass measuring 5 x 6 cm projecting inferolaterally from the ischium and separated from it by a 1.5 cm cleft. The apposing margins of the ischium and the apophysis are 'scalloped' and there are faint, irregular calcifications along this line."

The ischial apophysis was removed surgically, the ischium trimmed, and the hamstring muscles repaired. Sections showed osseous and cartilagenous tissue with areas of metaplasia. Periosteal new bone was present around the periphery of the densely ossified matrix. Recovery was uneventful and films shortly after operation showed some soft-tissue calcification in the region of the removed mass. (Figure 2C.)

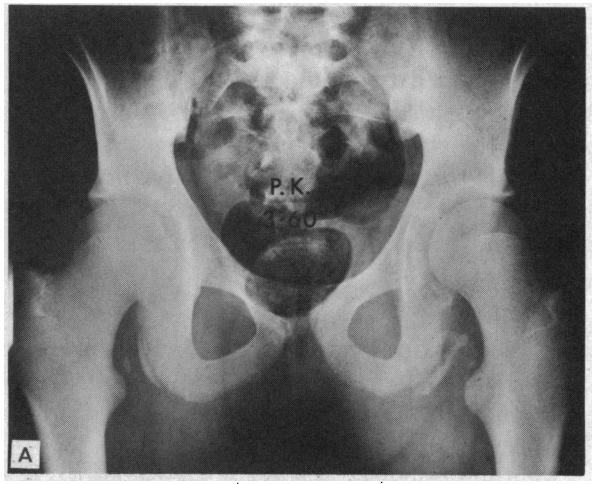
The patient was asymptomatic, but films taken 14 months after operation (Figure 2D) showed: "There has been regrowth and reossification of the mass noted in May 1961 and this is approximately the same size as on that examination. It is fused to the ischium, but there is a cleft across it at the junction of the middle and distal thirds with irregular calcification."

Figure 3 (Case 2).—Film six years after operation shows some involution of the bony mass, which extends 4 cm below the ischium. The patient was still asymptomatic.

There was some involution of the bony mass without additional treatment, and six years later films (Figure 3) showed that it extended 4 cm below the ischium. The patient was asymptomatic at this time and engaged in athletic events without difficulty.

Case 3. At age 13, the patient began to have pain in the left hip and buttock. There was no definite history of trauma, but he may have injured himself when getting out of a jeep rapidly six months earlier. Because of mild but constant pain x-ray study was done two years later. This showed (Figure 4A): "Old avulsion of the apophysis of the left ischium with slight separation and irregular calcification along the cleft. There is about 25 percent bony overgrowth of this center as compared with the right side. The margin of the left ischium shows an irregular, shallow defect."

Operation was not done; the patient was treated symptomatically. In the next seven years the pain decreased and when last seen at age 23, he was asymptomatic and engaged in sports without difficulty except for some discomfort when jumping hurdles. Films at this time showed (Figure 4B): "Residual deformity of the left ischium, which is widened and has a slightly irregular trabecular pattern, secondary to union of the previously noted avulsed apophyseal center."



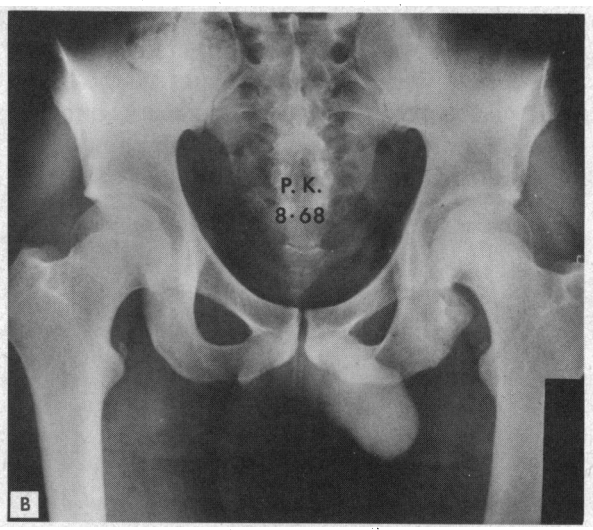


Figure 4 (Case 3).—A—Film taken two years after minor trauma shows avulsion and slight overgrowth of the apophysis of the left ischium. B—Deformity of the left ischium secondary to union of the old avulsed apophysis, ten years after trauma. The patient was asymptomatic.

Discussion

The treatment of this entity should depend on the extent of injury and the clinical findings. It is now well recognized that some cases of ischial apophyseal avulsion respond very well to conservative treatment, and follow-up reveals bony union of the apophysis with deformity but no symptoms. On the other hand, avulsion with pronounced separation of the fragments or avulsion of the center plus a fragment of ischium may call for more definitive treatment with surgical reduction. In late cases of bony overgrowth causing pain or impairment of activity, excision of the mass may be necessary. Before deciding

on treatment the problem in each case should be analyzed, with severity of initial symptoms, time elapsed between injury and the initial examination and the extent of the deformity shown by the radiograph all taken into account. It is our belief that in the presence of a fresh avulsion fracture with significant separation of the fragments, early open reduction is indicated.

Summary

Three cases of avulsion of the ischial tuberosity are presented. Two of these patients who had pronounced bony overgrowth, were referred because of suspicion of bone tumors.

Avulsion fractures, if there is no displacement, respond very well to conservative treatment. In avulsion fracture with separation of the fragments, early open reduction should be the treatment of choice. In old ununited cases, removal of the mass with reattachment of the tendons is indicated if the patient is symptomatic.

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Refer to: Davidson S: Solitary myeloma with peripheral polyneuropathy—Recovery after treatment. Calif Med 116:68-71, Jan 1972

Solitary Myeloma with Peripheral Polyneuropathy—Recovery after Treatment

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PREVIOUS REPORTS have discussed the occurrence of peripheral neuropathy and myeloma. Chronic polyneuropathy associated with either multiple myeloma or solitary myeloma has been described.[1,2,3]

Some recent papers have noted the neuropathy of myeloma as the presenting complaint and compared this syndrome with the neuropathic phenomena which occur as remote, non-metastatic complications of occult carcinoma.[4,5]

Most of the patients described have had multiple myeloma but some had solitary myeloma.[6] A particular relationship between an osteosclerotic type of myeloma and peripheral neuropathy has been suggested.[7,8] Postmortem examinations have not revealed direct myelomatous or amyloid infiltration of the peripheral nerves but demyelination has been noted in the spinal cord, nerve roots and peripheral nerves.[9,10]

The patients who present with occult solitary myeloma, manifested by only peripheral polyneuropathy, are a particularly interesting group, since many of them have normal sternal bone marrow and normal peripheral blood smear, and do not have abnormalities of serum protein immuno-electrophoresis or Bence-Jones proteinuria. The spinal fluid protein is often elevated. Roentgenograms of the skeleton usually reveal an osteolytic lesion or, less often, osteosclerosis.

The present case report is of particular interest because it provides an example of the diagnosis, treatment and recovery of a patient with a soli-

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